Master of Science in Intelligent Reliable Systems (IRS) Programme
(Civilingeniør i Pålidelige Automatiserings Systemer (IRS))

Accommodation Pressure Control of Dan Bravo Off-Shore Platform

Cooperated between Aalborg University Esbjerg and Mærsk Oil & Gas A/S

1. INTRODUCTION

The air pressure inside the accommodations on offshore platforms needs to be about 50 Pa above the atmospheric pressure. This is required to prevent eventual gas escape to enter the accommodation area and harm personal. Furthermore, in order to create a comfortable and healthy environment, the indoor air has to be exchanged six times per hour. Apparently, Mærsk Oil &Gas A/S has some problems regarding to its accommodation air pressure control system on its Dan Bravo offshore platform.

Fig. 1 Dan Bravo Platform in North Sea

2. OBJECTIVE

The project is to investigate a better and reliable solution for the air pressure control problem on Dan Bravo. Furthermore, the fault detection and diagnosis for potential faults in this system needs also be explored explicitly.

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3. STRATEGY

A modern control method, namely Model Predictive Control (MPC), is employed for control development, after a mathematical model is developed for the considered system. The extension of Kalman filter method, namely a bank of Kalman filters, is used for fault detection and diagnosis purpose after the fault scenarios are analyzed.

4. RESULT

The developed MPC successfully controls the air pressure under the nonlinear simulation. The bank of Kalman filters can efficiently distinguish different actuator faults.

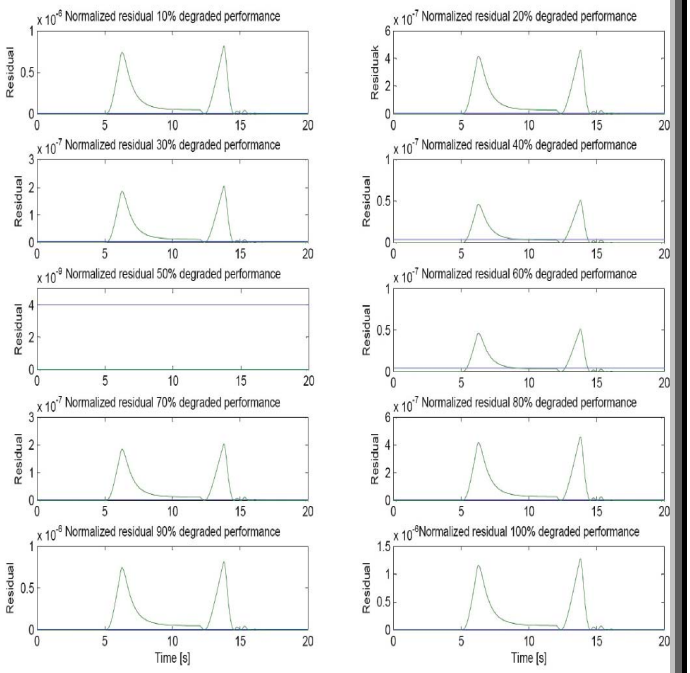

Fig. 2 Normalized residuals from Bank of Kalman Filters (10% difference of entire actuator range)